AMENDMENTS TO THE CLAIMS

1. (Cancelled)

2. (Cancelled)

3. (Cancelled)

4. (Cancelled)

5. (Cancelled)

6. (Cancelled)

7. (Cancelled)

8. (Cancelled)

9. (Cancelled)

10. (Cancelled)

11. (Cancelled)

12. (Cancelled)

13. (Cancelled)

14. (Cancelled)

15. (Currently Amended) An apparatus for continuously forming thermoplastic products having precision microstructured surfaces thereon, comprising:

a continuous double band press having upper and lower primary bands providing a ~~relatively~~ substantially planar region therebetween, at least one of said bands being provided with a tool surface having the inverse topography of the precision microstructured surface to be formed, the inverse topography being sized to provide embossing depths of less than 1000 microns;

means for continuously feeding a thermoplastic material through said press and between said bands;

means for heating said material to its embossing temperature T_e;

means for applying sufficient pressure to said ~~belts~~ bands to cause the precise engagement of said heated thermoplastic material with said ~~belts~~ bands and said tool surface to emboss said material with said precise microstructured pattern; and

means for cooling said material while maintaining pressure on said material, and while said material is moving through said press.

16. (Original) The apparatus according to claim 15, in which the upper primary band is provided with said tool surface having the inverse topography of the structure to be formed.

17. (Original) The apparatus according to claim 15, wherein said lower primary band is provided with said tool surface having the inverse topography of the precision microstructure to be formed.

18. (Original) The apparatus of claim 15, wherein each of said upper and lower bands is provided with a tool surface having the inverse topography of the precision microstructure surface to be formed.

19. (Original) The apparatus of claim 15, and wherein said tool surface is provided on an overlay band and said overlay band is positioned on one of said upper or lower primary bands.

20. (Original) The apparatus of claim 19, wherein said overlay band is positioned on said upper primary band.

21. (Original) The apparatus of claim 19, wherein said overlay band is positioned on said lower primary band.

22. (Original) The apparatus of claim 19, wherein an overlay band is positioned on each of said upper and lower primary bands.

23. (Currently Amended) The apparatus of claim 15, wherein said pressure ~~producing~~ applying means is ~~provided~~ capable of applying pressure to said material in a range of 250 to 1000 psi (1.72 MPa to 6.89 MPa).

24. (Original) The apparatus of claim 15, wherein said heating means is capable of heating said material within a range of 250° to 750°F (121°C to 399°C).

25. (Original) The apparatus of claim 15, wherein said bands are operated such that said material is fed through said press at a rate of between about 21 (6.40) and about 32 (9.75) feet (meters) per minute.

26. (Currently Amended) The apparatus of claim 15, wherein said heating means and said pressure applying means are operated so that the temperature of ~~combining~~ said material ~~to between the~~ is within a range of 250° to 580°F (121°C to 304°C) and said pressure applied is about 150-1000 psi (1.03 0 6.89 MPa).

27. (Currently Amended) The apparatus according to claim 15, wherein said cooling means cools the material to within a ~~in the~~ range of ~~between~~ about 35° to 75°F (2°C to 24°C).

28. (Cancelled)

29. (Cancelled)

30. (Cancelled)

31. (Cancelled).

32. (Cancelled)

33. (Cancelled)

34. (Cancelled)

35. (Cancelled)

36. (Cancelled)

37. (Cancelled)

38. (Cancelled)

39. (Cancelled)

40. (Cancelled)

41. (Cancelled)

42. (Cancelled)

43. (Cancelled)

44. (Cancelled)

45. (Cancelled)

46. (Cancelled)

47. (Cancelled)

48. (Cancelled)

49. (Currently Amended) An ~~The~~ apparatus ~~of claim 19,~~ for continuously forming thermoplastic products having precision microstructured surfaces thereon, comprising:

a continuous double band press having upper and lower primary bands providing a substantially planar region therebetween, at least one of said bands being provided with a tool surface having the inverse topography of the precision microstructured surface to be formed;

means for continuously feeding a thermoplastic material through said press and between said bands;

means for heating said material to its embossing temperature T_{ei};

means for applying sufficient pressure to said belts to cause the precise engagement of said heated thermoplastic material with said belts and said tool surface to emboss said material with said precise microstructured pattern; and

means for cooling said material while maintaining pressure on said material, and while said material is moving through said press;

wherein said tool surface is provided on an overlay band and said overlay band is positioned on one of said upper or lower primary bands; and

further including tracking/steering means for said overlay band to keep said band in alignment with said primary band.

50. (New) The apparatus of claim 20, wherein said overlay band is attached to and travels with said upper primary band.

51. (New) The apparatus of claim 21, wherein said overlay band is attached to and travels with said lower primary band.

52. (New) The apparatus of claim 22, wherein said overlay bands are attached to and travel with said upper and lower primary bands, respectively.

53. (New) An apparatus for continuously forming thermoplastic products having precision microstructured surfaces thereon, comprising a continuous double band press having upper and lower bands providing a substantially planar region therebetween, at least one of said bands being provided with a tool surface having the inverse topography of the precision microstructured surface to be formed, the inverse topography being sized to provide embossing depths of less than 1000 micron.

54. (New) The apparatus according to claim 53, wherein the inverse topography includes at least a portion for forming an array of microcube elements.

55. (New) The apparatus according to claim 53, wherein the inverse topography includes at least a portion for forming a pattern of microfluidic channels.

56. (New) The apparatus according to claim 53, wherein the inverse topography includes at least a portion for forming an array of precise geometric recessed profiles.

57. (New) The apparatus according to claim 56, wherein each recess comprises:

a flat bottom surface with a major dimension of about 1000 microns or less,

an upwardly tapered wall at an angle of between 10°-90° normal to the bottom surface;

a depth of between 0.10 microns to 1000 microns; and

an upper opening with a major dimension between about 0.10 microns to 1000 microns.

58. (New) The apparatus according to claim 53, wherein the upper band is provided with the tool surface having the inverse topography.

59. (New) The apparatus according to claim 58, wherein the tool surface is on an overlay band that is positioned on the upper band.

60. (New) The apparatus according to claim 59, wherein the overlay band is attached to, and travels with, the upper band.

61. (New) The apparatus according to claim 53, wherein the lower band is provided with the tool surface having the inverse topography.

62. (New) The apparatus according to claim 61, wherein the tool surface is on an overlay band that is positioned on the lower band.

63. (New) The apparatus according to claim 62, wherein the overlay band is attached to, and travels with, the lower band.

64. (New) The apparatus according to claim 53, wherein each the upper band and the lower band is provided with the tool surface having the inverse topography.

65. (New) The apparatus according to claim 64, wherein the tool surface is on an overlay band that is positioned on the upper band and on an overland band that is positioned on the lower band.

66. (New) The apparatus according to claim 65, wherein the overlay bands are respectively attached to, and travel with, the upper band and the lower band.

67. (New) The apparatus of claim 15, and wherein said tool surface is provided on an overlay which is attached to, and rotates with at least one of the upper and lower primary bands.

68. (New) An apparatus for continuously forming thermoplastic products having precision microstructured surfaces, said apparatus comprising:

a continuous double band press having an upper belt and a lower belt defining a substantially planar region therebetween through which the thermoplastic material travels;

a reaction zone within the substantially planar region including an upstream heated section whereat the thermoplastic material is heated to its embossing temperature T_e as pressure is applied and a downstream heated section whereat the thermoplastic material is cooled as pressure is applied; and

an overlay with a tool surface having inverse topography of the precision microstructured surface to be formed, the inverse topography being sized to provide embossing depths of less than 1000 microns;

wherein the overlay travels through the reaction zone with the thermoplastic material so that, in the upstream heated section, the tool surface precisely engages the thermoplastic material to emboss it with the precision microstructured surface.

69. (New) An apparatus as set forth in claim 68, wherein the overlay is attached to the upper belt.

70. (New) An apparatus as set forth in claim 69, wherein the overlay is an overlay band which travels with the upper belt.

71. (New) An apparatus as set forth in claim 68, wherein the overlap is attached to the lower belt.

72. (New) An apparatus as set forth in claim 71, wherein the overlay is an overlay band which travels with the lower belt.

73. (New) An apparatus as set forth in claim 68, further comprising a second overlay also having a tool surface with inverse topography of the precision microstructured pattern to be continuously formed, the inverse topography being sized to provide embossing depths of less than 1000 microns; and

wherein the second overlay also travels through the reaction zone with the thermoplastic material so that, in the upstream heated section, the tool surface of the second overlay precisely engages the thermoplastic material to emboss it with the precision microstructured pattern.

74. (New) An apparatus as set forth in claim 73, wherein the first overlay is attached to the upper belt and the second overlay is attached to the lower belt.

75. (New) An apparatus as set forth in claim 74, wherein the first overlay is an overlay band which travels with the upper belt and the second overlay is an overlay band which travels with the lower belt.

76. (New) An apparatus for continuously forming thermoplastic products having precision microstructured surfaces, said apparatus comprising:

a continuous double band press having an endless upper belt and an endless lower belt defining a substantially planar region therebetween through which the thermoplastic material travels;

a reaction zone within the substantially planar region including an upstream heated section whereat the thermoplastic material is heated to its embossing temperature T_e as pressure is applied and a downstream heated section whereat the thermoplastic material is cooled as pressure is applied;

an overlay with a tool surface having inverse topography of the precision microstructured surface to be formed, the overlay traveling through the reaction zone with the thermoplastic material so that, in the upstream heated section, the tool surface precisely engages the thermoplastic material to emboss it with the precision microstructured surface; and

tracking/steering rollers for keeping the overlay in alignment with the upper belt and/or the lower belt.

77. (New) An apparatus as set forth in claim 76, wherein the overlay is attached to the upper belt.

78. (New) An apparatus as set forth in claim 77, wherein the overlay is an overlay band which travels with the upper belt.

79. (New) An apparatus as set forth in claim 76, wherein the overlap is attached to the lower belt.

80. (New) An apparatus as set forth in claim 79, wherein the overlay is an overlay band which travels with the lower belt.

81. (New) An apparatus as set forth in claim 80, further comprising a second overlay also having a tool surface with inverse topography of the precision microstructured pattern to be continuously formed, the inverse topography being sized to provide embossing depths of less than 1000 microns; and

wherein the second overlay also travels through the reaction zone with the thermoplastic material so that, in the upstream heated section, the tool surface of the second overlay precisely engages the thermoplastic material to emboss it with the precision microstructured pattern.

82. (New) An apparatus as set forth in claim 81, wherein the first overlay is attached to the upper belt and the second overlay is attached to the lower belt.

83. (New) An apparatus as set forth in claim 82, wherein the first overlay is an overlay band which travels with the upper belt and the second overlay is an overlay band which travels with the lower belt.

* * *